Remarks

The present amendment replies to the Official Action mailed on April 23, 2003. In the Official Action, claims 1-4, 6-9 and 12 were rejected under 35 U.S.C. 103(a) over U.S. Patent No. 6,453,102 ("Dong"). Claims 5, 10, and 11 were rejected under 35 U.S.C. 103(a) over Dong and further in view of U.S. Patent No. 6,304,691 ("Espindola"). The rejection of claims 1-12 is respectfully traversed. In addition, new claims 13-18 are hereby added to the application. Claims 1-18 are presently pending.

Following a brief summary of the invention to provide context, each of the issues raised in the Official Action is addressed in turn below.

Brief Summary of the Invention

As the optical transmission industry continues to develop, there is an ever growing demand for high performance transmission lines that can carry wide signal bandwidths at extremely high transmission speeds over distances of hundreds of miles. However, the ability of the optical transmission industry to meet this demand has been frustrated by the problem of dispersion. As discussed in the specification, dispersion can have a significant effect on signal integrity, and presents a formidable barrier to continuing progress in the industry.

Dispersion results from the optical properties of standard optical transmission fibers, which typically have a gentle positive dispersion slope. As transmission lines become longer and longer, the amount of dispersion in a standard optical transmission fiber increases to the point where it causes a degradation of optical signals being carried along the fiber. One solution that has been developed to cope with this problem is the introduction of a class of fibers known as "dispersion compensating fibers" (DCFs), which typically have a steep negative dispersion slope.

By connecting one or more lengths of DCF into an optical transmission line, dispersion may be reduced to desired levels.

However, the use of prior art DCF to manage dispersion has proven to be unsatisfactory. Although it is possible, using prior art DCF, to manage dispersion at a specified operating frequency, it has been found that the quality of dispersion management drops off sharply at frequencies above or below the operating frequency. This dropoff thus significantly limits the bandwidth of the optical transmission system.

As discussed in the specification, one reason for this dropoff in dispersion management around the operating frequency is the difference in the shapes of the dispersion function of a typical transmission line and the dispersion function of a typical prior art DCF. A typical transmission line has a dispersion function that has a relatively constant slope. In other words, the standard transmission fiber dispersion function is substantially a straight line. A DCF, on the other hand, has a dispersion function that is significantly curved. In other words, a DCF has a dispersion function with a varying slope. It is this curvature in the DCF dispersion function that narrows the bandwidth available in a prior art DCF-managed optical transmission line.

A typical DCF has an "S-shaped" dispersion function, with a second derivative that changes from negative to positive at an inflection point. It was applicants' concept to attempt to create a DCF having a dispersion function with an inflection point within a specified operating bandwidth around a specified operating frequency of an optical transmission line, and further having a relative dispersion slope matching the relative dispersion slope of the optical transmission line over the specified bandwidth. Using this approach, the applicants developed a DCF that is significantly different from prior art fibers, as evidenced by the markedly superior performance of applicants' DCF.

Applicants' approach represented a significant departure from prior practice. As discussed in the specification, the prior art taught away from developing a DCF fiber having a dispersion function with an inflection point within a specified bandwidth around a specified operating frequency of an optical transmission line. Such an approach was avoided in the past for a number of reasons, including sensitivity to manufacturing variation and extreme bend and splice losses.

Rejection of Claims 1-4, 6-9 and 12

Claims 1-4, 6-9 and 12 stand rejected under 35 U.S.C. § 103(a) over Dong. Quite simply, Dong does not teach and does not suggest the claimed invention. Therefore, this rejection is respectfully traversed.

Dong is directed to, among other things, a dispersion compensating module and a dispersion compensating fiber therein. As pointed out by the Examiner in the Official Action:

> [Dong] fails to disclose the fiber to be designed to have a wavelength inflection point at a wavelength within the operating bandwidth, a dispersion compensating fiber to have a dispersion curve of the entire dispersion fiber and the individual fibers that substantially matches the relative dispersion curve of a transmission fiber over a bandwidth and each segment of the fibers to have a relative refractive index difference.

These elements of the claimed invention, among others, would not have been obvious to a practitioner of ordinary skill in the art. As discussed above, and as described in the specification, the design and fabrication of the claimed dispersion compensating fiber and dispersion compensating module represented a significant departure from the prior art, requiring an insightful analysis and rethinking of prior art design techniques.

Thus, it is respectfully asserted that claims 1-4, 6-9 and 12 are patentable over Dong.

Rejection of Claim 5, 10 and 11

Claims 5, 10 and 11 stand rejected over Dong and Espindola. This rejection is also respectfully traversed.

Espindola fails to add anything of significance to Dong. Specifically, Espindola does not teach and does not suggest the use of a DCF having an inflection point within a specified bandwidth around a specified operating frequency.

Thus, claims 5, 10 and 11 are allowable over Dong and Espindola.

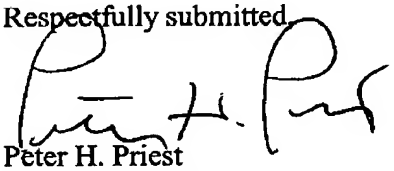
New Claims 13-18

New claims 13-18 have been added to the application. Claims 13-18 are directed to methods for compensating for dispersion in an optical transmission line and are allowable over the art of record for the reasons advanced above in support of the patentability of claims 1-12.

Conclusion

For the above reasons, it is asserted that claims 1-18 are allowable, and prompt allowance of the application is therefore requested. If the Examiner is of the opinion that an interview would be helpful in disposing of any remaining issues relating to the present application, the Examiner is invited to telephone the undersigned at (919) 806-1600.

Respectfully submitted,



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